

Amendments to th Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (*Currently amended*) Apparatus for the delivery of ions generated at atmospheric
2 pressure to a mass spectrometer having a vacuum system with an entrance
3 opening, the apparatus comprising
4 ~~(a) means for generating an ion generator that generates~~ an ionization cloud
5 containing ~~charged particles~~ ions at atmospheric pressure,
6 ~~(b) an entrance opening in the wall of the vacuum system of the mass~~
7 ~~spectrometer,~~
8 ~~(c) an ion migration drift tube between the ionization cloud generator and the~~
9 entrance opening, the drift tube receiving the ionization cloud,
10 ~~(d) means for producing (c) a field-generating apparatus that produces~~ a potential
11 gradient inside the ion migration drift tube that draws ions of the ionization cloud
12 toward the entrance opening, and
13 ~~(e) means to generate (d) a gas port through which a counterstream of gas inside~~
14 may be introduced to the ion migration drift tube in a direction opposite to a
15 direction of ion travel.
- 1 2. (*Currently amended*) Apparatus according to Claim 1 wherein ~~means for~~
2 ~~electrospraying generate the ionization cloud by spraying the ion generator~~
3 comprises an electrospray apparatus with a spray capillary that sprays a solution
4 containing analyte molecules.
- 1 3. (*Original*) Apparatus according to Claim 2 wherein a pneumatic gas device
2 supports the spraying.
- 1 4. (*Currently amended*) Apparatus according to Claim 2 ~~wherein~~ further comprising
2 an arrangement of electrodes and power supplies that produce a strong electric
3 field in front of the spray capillary.

- 1 5. (*Currently amended*) Apparatus according to Claim 1 wherein the ion generator
2 comprises a pulse laser that forms an ionization cloud by laser desorption.
- 1 6. (*Currently amended*) Apparatus according to Claim 1 wherein ~~a gas supply~~
2 ~~device admixes~~ further comprising a ionization gas input path through which
3 gaseous substances may be admixed to the ionization cloud prior to its entry into
4 the drift tube.
- 1 7. (*Currently amended*) Apparatus according to Claim 1 wherein further comprising
2 a needle for producing corona discharge ~~is arranged~~ in the vicinity of the
3 ionization cloud.
- 1 8. (*Currently amended*) Apparatus according to Claim 1 wherein further comprising
2 a UV lamp for photoionization ~~is arranged~~ in the vicinity of the ionization cloud.
- 1 9. (*Currently amended*) Apparatus according to Claim 1 wherein further comprising
2 an electron source ~~is arranged~~ in the vicinity of the ionization cloud.
- 1 10. (*Original*) Apparatus according to Claim 9 wherein the electron source contains a
2 foil emitting beta radiation.
- 1 11. (*Currently amended*) Apparatus according to Claim 1 wherein ~~a gas supply~~
2 ~~introduces the protective or drying~~ the gas port introduces gas into the drift tube
3 near the entrance opening of the mass spectrometer.
- 1 12. (*Currently amended*) Apparatus according to Claim 11 wherein ~~a heating device~~
2 ~~heats the drying gas~~ introduced through the gas port is heated before introduction
3 into the drift tube.
- 1 13. (*Currently amended*) Apparatus according to Claim 1 wherein the wall of the ion
2 migration drift tube ~~is provided with~~ comprises a large number plurality of
3 electrodes ~~to~~ that produce the potential gradient in the drift tube.

- 1 14. (*Currently amended*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube ~~is made from or coated with~~ comprises a resistance material.
- 1 15. (*Currently amended*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube has a conical or trumpet shape ~~where the~~ with a wider opening is being
3 directed towards the ~~ionization cloud~~ ion generator.
- 1 16. (*Currently amended*) Apparatus according to Claim 1 wherein ~~the~~ an opening of
2 the ion migration drift tube ~~to the spray chamber~~ facing the ion generator is
3 covered by a grid which bulges outwards.
- 1 17. (*Currently amended*) Apparatus according to Claim 1 wherein the entrance
2 opening ~~belongs to~~ is part of a transfer capillary, and wherein ~~the~~ an outer shape
3 of ~~the~~ a tip of the transfer capillary is ~~curved with a small radius of the inscribed~~
4 ~~vertex circle~~ convex.
- 1 18. (*Currently amended*) Apparatus according to Claim 1 wherein the entrance
2 opening ~~has a smoothed, slightly funnel-shaped or trumpet-shaped form~~
3 approximates a funnel shape.
- 1 19. (*Currently amended*) Apparatus according to Claim 1 ~~wherein a device further~~
2 comprising a ionization gas input path through which a hot drying gas and
3 charged particles may be admixes particles to the hot drying gas admixed to the
4 ionization cloud, the particles having a charge that allows them being able to
5 neutralize ~~some of the ions in the spray chamber or later in the drift tube~~.
- 1 20. (*Currently amended*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube ~~is meander, spiral or helix shaped or is bent in some other shape~~ has a
3 curved shape.
- 1 21. (*Currently amended*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube is a first drift tube, and wherein the apparatus further comprises
3 additional drift tubes such that the ~~several~~ ion migration drift tubes are connected
4 to one another, ~~either straight or arranged at an angle to each other~~.

- 1 22. (*Currently amended*) Apparatus according to Claim 1 wherein the ~~entrance grid~~
2 of the ion migration drift tube comprises an entrance grid that consists of a
3 pattern of wires with switchable voltage supplies connected to the wires to either
4 ~~allow or hinder ions to enter~~ control ion entry into the ion migration drift tube.
- 1 23. (*Currently amended*) Method for feeding ions at atmospheric pressure to a mass
2 spectrometer, the method comprising the following steps:
3 (a) forming an ionization cloud containing charged particles at atmospheric
4 pressure,
5 (b) guiding the charged particles by their ion mobility through an ion migration drift
6 tube with an inner potential gradient to the an entrance opening of the mass
7 spectrometer, and
8 (c) blowing ~~clean protective gas or drying gas~~ into the ion migration drift tube at
9 ~~the side of~~ from adjacent the entrance opening.
- 1 24. (*Original*) Method according to Claim 23 wherein the ionization cloud is created
2 by spraying a solution containing dissolved analyte from a spray capillary.
- 1 25. (*Original*) Method according to Claim 24 wherein the spraying is pneumatically
2 supported by a spray gas.
- 1 26. (*Currently amended*) Method according to Claim 24 ~~wherein~~ further comprising
2 drawing charged droplets into the ionization cloud using a strong electric field in
3 front of the spray capillary ~~draws charged droplets into the ionization cloud~~.
- 1 27. (*Original*) Method according to Claim 23 wherein the ionization cloud is created
2 by bombardment of a sample with light from a pulsed laser.
- 1 28. (*Currently amended*) Method according to Claim 23 ~~wherein~~ further comprising
2 admixing other gaseous substances ~~are admixed~~ to the ionization cloud.
- 1 29. (*Currently amended*) Method according to Claim 23 ~~wherein~~ further comprising
2 providing a corona discharge that produces primary ions in the vicinity of the
3 ionization cloud which lead to chemical ionization of the analyte molecules via a
4 chain of ion-molecule reactions.

- 1 30. (*Currently amended*) Method according to Claim 23 wherein further comprising
2 using a UV lamp ~~contributes to~~ for ionizing the substances in the ionization cloud.
- 1 31. (*Currently amended*) Method according to Claim 23 wherein further comprising
2 using an electron source ~~contributes to~~ for ionizing the substances in the
3 ionization cloud.
- 1 32. (*Currently amended*) Method according to Claim 31 wherein a foil emitting beta
2 radiation is used as ~~an~~ the electron source.
- 1 33. (*Currently amended*) Method according to Claim 23 wherein the ~~protective or~~
2 ~~drying~~ gas is introduced into the drift tube ~~in the neighborhood of the entrance~~
3 ~~opening of the mass spectrometer and flows through the drift tube in the direction~~
4 ~~of the ionization cloud~~ in a direction opposite the travel direction of the charged
5 particles.
- 1 34. (*Currently amended*) Method according to Claim 33 wherein the ~~protective or~~
2 ~~drying~~ gas is heated before being introduced into the drift tube.
- 1 35. (*Currently amended*) Method according to Claim 23 wherein further comprising
2 admixing charged particles ~~are admixed~~ to the ~~hot drying~~ gas, whereby the
3 particles neutralize some of the ions ~~which are formed in the spray chamber or~~
4 ~~later in the drift tube~~.
- 1 36. (*Currently amended*) Method according to Claim 35 wherein ~~the~~ further
2 comprising irradiating an area around the entrance opening ~~is radiated~~ with UV
3 radiation ~~releasing~~ to release photoelectrons ~~from the head of the transfer~~
4 ~~capillary which lead to neutralization of the~~ that neutralize ions in the outer region
5 of the ion trail.
- 1 37. (*Currently amended*) Method according to Claim 23 wherein the charged
2 particles are ~~generated or~~ admitted into the drift tube as pulses, and wherein the
3 drift tube ~~thus~~ operates as an ion mobility spectrometer, and wherein the mass
4 spectrometer measures ion of different mobilities separately.